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# Two New Species of *Festuca* (Gramineae: Pooideae) from Mexico

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**ABSTRACT.** Two new species of *Festuca* from Mexico are described and illustrated: *F. roblensis*, from the states of Guanajuato and Zacatecas, and *F. valdesii*, from the Sierra Madre Oriental in the states of Coahuila, Nuevo León, and Tamaulipas.

**RESUMEN.** Se describen e ilustran dos especies nuevas de *Festuca* de México: *F. roblensis*, de los estados de Guanajuato y Zacatecas, y *F. valdesii*, de la Sierra Madre Oriental en los estados de Coahuila, Nuevo León y Tamaulipas.

In the course of continuing studies of *Festuca* in Mexico, the following two novelties were discovered.

***Festuca roblensis*** M. González-Ledesma, sp. nov.

**TYPE:** Mexico. Zacatecas: Municipio de Jeréz, Rancho El Roble, 19 km de El Derramadero por terracería a Monte de los García, altitud ca. 2800 m, 7 Sep. 1993, M. González-Ledesma & J. García P. 530 (holotype, CHAPA; isotypes, ANSM, ENCB, IBUG, IEB, MEXU, MICH, MO, TEX, US). Figure 1.

Planta caespitosa, non rhizomatosa; innovationibus intravaginalibus. Culmi 100–130 cm alti, 1.6–2.6 mm diametri. Ligulae foliorum (1.3–)3.0–5.0 mm longae. Laminae foliorum planae, 30–55 cm longae, 1.5–3.6 mm latae, blandae, curvatae et longe attenuatae apicem versus. Panícula laxa, 16–26 cm longa. Spiculae (13–)14–19(–20) mm longae, 3–5(–6) floribus. Glumae inaequales,  $\frac{1}{3}$  vel minus spicula longitudine, gluma infera (2.5–)3.5–4.5(–4.8) mm longa, gluma supera (3.8–)4.0–5.5(–6.0) mm longa, haec flosculum tertium attingens. Lemmae (9.7–)10.0–12.5(–12.7) mm longae, aristae (0.5–)1.0–3.0(–3.7) mm longae. Antherae (4.0–)4.8–5.5 mm longae. Ovarium glabrum.

Plant densely caespitose, without rhizomes; innovations intravaginal. Culms erect, 100–130 cm tall, glabrous or sometimes scaberulous beneath the panicle, the lowest elongated internode 1.6–2.6 mm diam., the uppermost 2 nodes exposed. Leaf sheaths glabrous to scaberulous or scabrous api-

cally, the margins hyaline toward the apex and continuous with the ligule; auricles absent; fibers of the old, basal sheaths persistent. Ligules hyaline, lacerate, (1.3–)3.0–5.0 mm long on the 3 uppermost leaves. Leaf blades 30–55 cm long, 1.5–3.6 mm wide, lax, flat to loosely involute when dry, long-attenuate, involute and curved toward the apex; adaxial surface glabrous, with low ribs; abaxial surface glabrous to scabrous, the midrib prominent. Panicle 16–26 cm long, open, lax, the axis rounded and glabrous below, angular and scaberulous or scabrous above; branches scaberulous to scabrous; lowermost node with 2 branches and a total of (5–)7–14 spikelets; pedicels (3–)4–8 mm long. Spikelets (13–)14–19(–20) mm long, with 3–5(–6) florets, the rachis scabrous. Glumes unequal, with broad, hyaline margins,  $\frac{1}{3}$  or less as long as the spikelet, the lower 1-nerved, (2.5–)3.5–4.5(–4.8) mm long, the upper 3-nerved, (3.8–)4.0–5.5(–6.0) mm long, not surpassing the base of the third floret. Lemmas of the 2 lower florets (9.7–)10.0–12.5(–12.7) mm long, glabrous to scaberulous or scabrous toward the apex, with a terminal awn (0.5–)1.0–3.0(–3.7) mm long. Palea hyaline except the nerves, shorter than the lemma. Lodicules 1.0–1.5 mm long, irregularly bifid. Anthers (4.0–)4.8–5.5 mm long. Ovary apex glabrous. Caryopsis 5.5–7.0 mm long, the hilum linear.

**Leaf blade cross section.** Blades flat or shallowly V-shaped; adaxial ribs low and rounded; adaxial furrows shallow to moderately deep; bulliform cells conspicuous; vascular bundles 16, the first-order bundles closer to the adaxial than to the abaxial surface; sclerenchyma girders present above and below all bundles.

**Abaxial leaf blade epidermis.** Costal and intercostal zones differentiated; intercostal long cells 15–20 times longer than wide, with thin, slightly undulating walls; stomata few, restricted to the intercostal zone; intercostal prickles widely scattered,

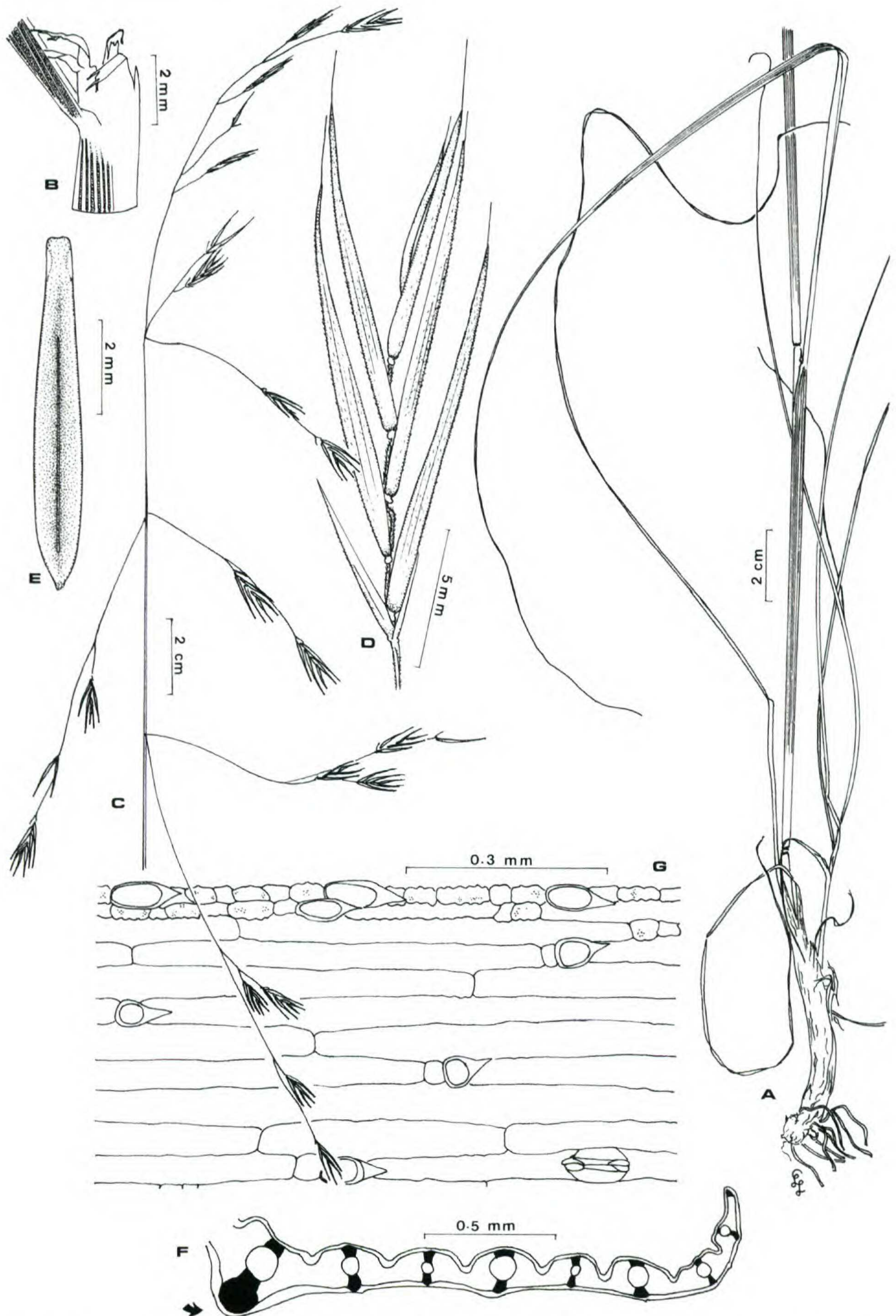


Figure 1. *Festuca roblensis* M. González-Ledesma. —A. Basal portion of a culm. —B. Ligule. —C. Panicle. —D. Spikelet. —E. Caryopsis. —F. Leaf blade cross section. Arrow indicates midrib. —G. Abaxial leaf blade epidermis. Based on M. González-Ledesma & J. García P. 530 (CHAPA).

with round to ovate bases; costal prickles more frequent, with elongated bases; silica and cork short-cell pairs in rows in the costal zone, silica bodies mostly horizontally elongated.

*Distribution and habitat.* *Festuca roblensis* is known only from the type locality in Zacatecas and from San Felipe, Guanajuato, where it was found in oak woods between the elevations of 2440 and 2800 m.

*Etymology.* The specific epithet refers to the type locality, the El Roble ranch.

*Festuca roblensis* is a member of a group of species related to *F. lugens* (E. Fournier) Hernández X. With these species it shares well-developed ligules, flat leaf blades, and awned lemmas. The principal morphological characteristics that distinguish the new species from the others in the group are the very narrow (1.5–3.6 mm), lax (not rigid) leaf blades; relatively thin (less than 3 mm diam.) culms; and the small (less than 6 mm long) second glumes. With respect to leaf blade anatomy, *F. roblensis* has several characters which, although they are found in other species, are unusual in the group, and do not occur in this particular combination in any other species. In the cross section, these are the low, inconspicuous adaxial ribs, well-developed bulliform cells, and the displacement of the first-order vascular bundles toward the adaxial surface. In the epidermis, they are the well-differentiated costal and intercostal zones, the horizontally elongated silica bodies, and the presence of stomata.

*Paratypes.* MEXICO. **Guanajuato:** Municipio de San Felipe, Club Campestre El Vergel de la Sierra, altitud 2440 m, 3 Sep. 1981, *R. Guzmán 4531* (COCA); 39 km al NE de León, sobre la carretera a San Felipe, altitud 2500 m, 13 Aug. 1990, *J. Rzedowski 49861* (CHAPA, IEB).

***Festuca valdesii*** M. González-Ledesma & S. D. Koch, sp. nov. TYPE: Mexico. Coahuila: Municipio de Arteaga, Sierra de Zapalinamé, altitud 3015 m, 19 May 1990, *J. Hinton et al. 20278* (holotype, CHAPA; isotypes, CHAP (panicle only), IEB). Figure 2.

Planta caespitosa, non rhizomatosa; innovationibus intravaginalibus et extravaginalibus. Culmi 80–130 cm alti, ascendentes. Ligulae foliorum minores quam 1 mm longae. Laminae foliorum planae, 25–35 cm longae, 2.4–4.0 mm latae, rigidae, non longe attenuatae apicem versus. Panicula laxa, 17–25 cm longa, nodus inferus cum 1–2 ramis et (6–)15–25 spiculis. Spiculae (8.0–)9.0–13.5(–14.3) mm longae, (2–)3–5 floribus. Glumae inaequales, spiculam  $\frac{1}{2}$  superans ad fere aequans, gluma inferior (4.0–)4.5–7.0(–8.3) mm longa, gluma superior (4.6–)5.0–8.5(–10.1) mm longa, haec flosculum ultimum attingens. Lemmae (6.2–)7.0–9.5(–9.9) mm longae, cari-

natae apicem versus, absque arista. Antherae 2.8–3.5 mm longae. Ovarium hispidum.

Plant glaucous, densely caespitose, without rhizomes; innovations intra- and extravaginal. Culms ascending, 80–130 cm tall, the lowest elongated internode 1.5–3.0 mm diam., the uppermost 2–3 nodes exposed. Basal leaves mostly dead at anthesis. Leaf sheaths glabrous to scaberulous; fibers of the old, basal sheaths persistent; auricles absent. Ligules membranaceous, truncate, short-ciliate, less than 1 mm long. Leaf blades 25–35 cm long, 2.4–4.0 mm wide, firm-textured, flat, loosely involute or convolute when dry, short-attenuate; adaxial surface scaberulous, with moderately prominent ribs; abaxial surface scaberulous. Panicle 17–25 cm long, open, lax, the axis glabrous below, scabrous above, terminating with 2–3, closely placed spikelets; lowest node with 1–2 branches and a total of (6–)15–25 spikelets. Spikelets (8.0–)9.0–13.5(–14.3) mm long, with (2–)3–5 florets. Glumes unequal, more than  $\frac{1}{2}$  as long as to nearly equaling the spikelet, scabrous only toward the apex and along the midrib, the lower (4.0–)4.5–7.0(–8.3) mm long, the upper (4.6–)5.0–8.5(–10.1) mm long, surpassing the base of the uppermost floret. Lemmas of the 2 lower florets (6.2–)7.0–9.5(–9.9) mm long, scaberulous to scabrous, with 3 or 5 prominent nerves, awn absent. Lodicules entire, not bifid. Anthers 2.8–3.5 mm long. Ovary apex hispid. Caryopsis about 4 mm long, hilum linear.

*Leaf blade cross section.* Blades flat; adaxial ribs rounded, moderately prominent; adaxial furrows moderately deep; bulliform cells conspicuous; vascular bundles 19, the first-order bundles equidistant from both surfaces or somewhat closer to the adaxial surface; sclerenchyma girders present above and below all bundles.

*Abaxial leaf blade epidermis.* Costal and intercostal zones differentiated; intercostal long cells 4–20 times longer than wide, with thin to thick, slightly to strongly undulating walls; stomata few to absent; intercostal prickles very few or absent; costal prickles abundant, with ovate to elongate bases; silica and cork short-cell pairs abundant in both zones, vertically elongated (occasionally square) in the intercostal zone, square to horizontally elongated in the costal zone.

*Distribution and habitat.* *Festuca valdesii* is native to the northern Sierra Madre Oriental in the states of Coahuila, Nuevo León, and Tamaulipas. It grows at elevations of 2600–3400 m in forests with *Pseudotsuga*, *Picea*, *Abies*, *Pinus*, or *Cupressus*.

*Etymology.* This new species is named in honor of Jesús Valdés Reyna, the person who best knows

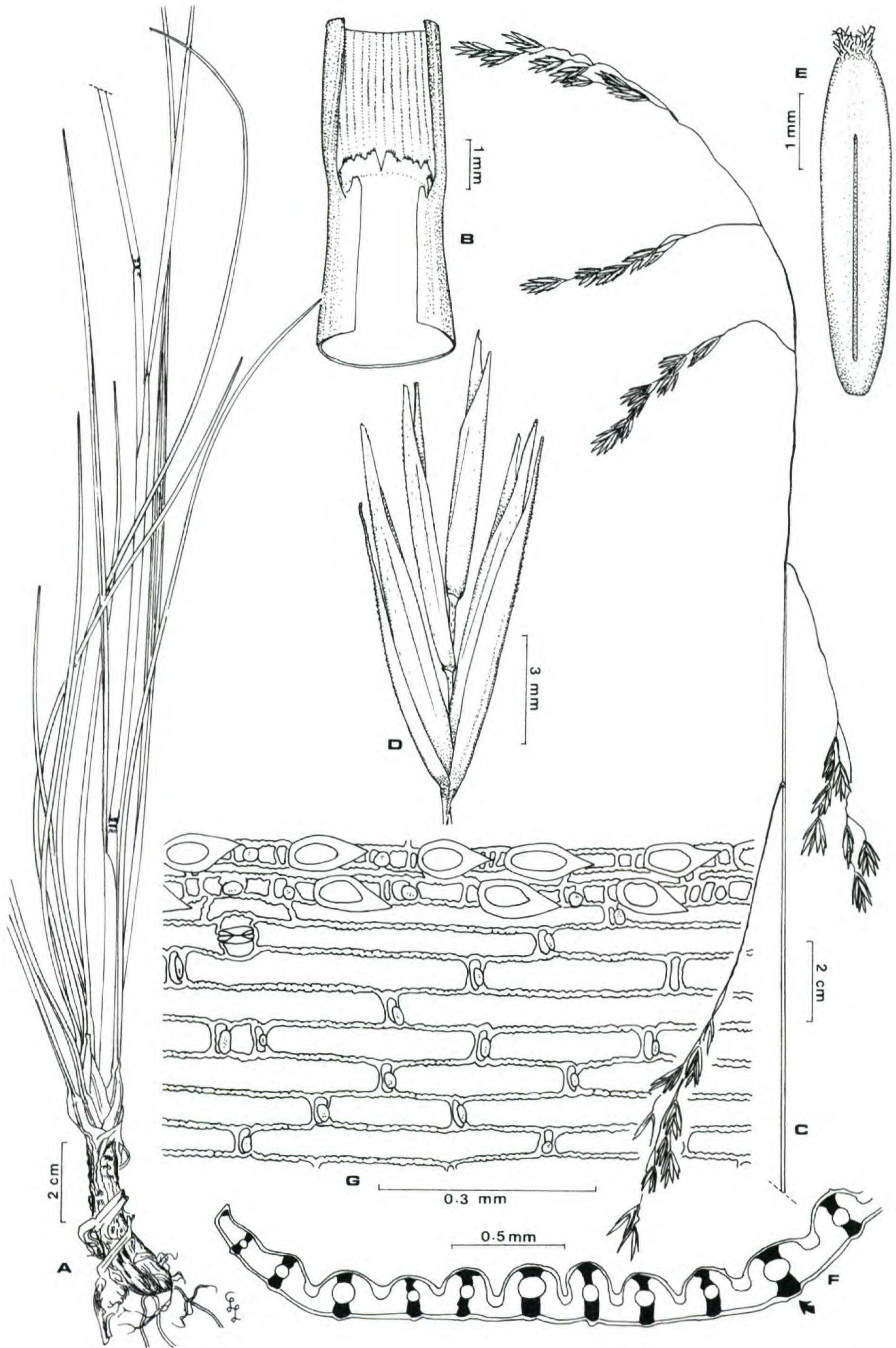


Figure 2. *Festuca valdesii* M. González-Ledesma & S. D. Koch. —A. Basal portion of a culm. —B. Ligule. —C. Panicle. —D. Spikelet. —E. Caryopsis. —F. Leaf blade cross section. Arrow indicates midrib. —G. Abaxial leaf blade epidermis. A & B based on *J. Hinton et al.* 20278 (CHAPA); others based on *M. González-Ledesma & J. García P.* 697 (CHAPA).

the grasses of the northern Sierra Madre Oriental and who kindly sent us the first specimens of this species.

This species has been confused with *F. amplissima* Ruprecht ex E. Fournier because of its large size, flat leaf blades, and open, lax panicles. In addition, both species grow in humid conifer forests. It can be distinguished from the latter species on the basis of its glaucous foliage, short-attenuate (not long-attenuate) leaf blades, which are 25–35 cm long and 2.4–4.0 mm wide [not 30–60(–95) cm long and (3.5–)4–12(–16) mm wide]; its smaller panicles [17–25 cm, not (20–)25–35 cm long] with 1–2 branches and a total of (6–)15–25 spikelets at the lowest node [not 2–4(–5) branches and a total of 25–70(–200) spikelets]; and its ovaries, which are hispid (not glabrous) at the apex.

The geographic distribution of this species includes the state of Tamaulipas, even though no specimens are cited. The basis for this is that the two collections from Cerro Peña Nevada (*González-Ledesma & García* 697 and 702) were made from

populations that extend across the boundary between Nuevo León and Tamaulipas. The specimen labels arbitrarily attribute the collections to Nuevo León to facilitate future data management.

*Paratypes.* MEXICO. **Coahuila:** Municipio de Arteaga, Sierra de la Marta, 14 km de San Antonio de las Alazanas por camino a Mesa de las Tablas, altitud 2700 m, 2 Oct. 1986, *M. González-Ledesma & S. D. Koch* 232 (CHAPA); 25°14'20"N, 100°28'00"W, altitud 2600 m, 26 Aug. 1975, *J. Passini & M. F. Robert* 4295 (ENCB, MO not seen); El Picacho, parte superior de la Sierra de Zapalinamé, aproximadamente 3.5 km al SE de Saltillo, altitud 2600–2800 m, 29 Sep. 1980, *R. López A. & S. A. González s.n.* (ANSM 2 specimens). **Nuevo León:** Municipio de Rayones, Sierra de la Marta, El Cedral, altitud 3200 m, 6 Sep. 1994, *J. A. Villarreal* 7906 (ANSM); Municipio de Ignacio Zaragoza, cerro Peña Nevada, altitud 3300 m, 3 Oct. 1994, *M. González-Ledesma & J. García P.* 697 (CHAPA); altitud 3400 m, 3 Oct. 1994, *M. González-Ledesma & J. García P.* 702 (CHAPA).

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